

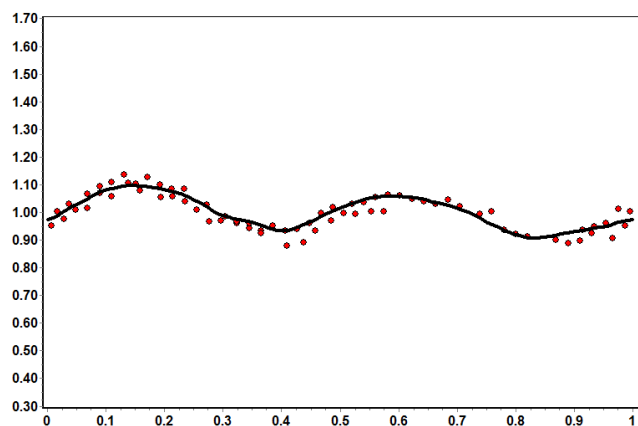


Figure 11. Comparison of model (black) and data (red) curves for 2012 Apr 6.

As mentioned earlier, we did two models, one based on periods of about 4 and 8 hours. While the fit of the model to the data for the 8-hour period was also good, the shape was less reasonable (“too square”) and the pole search results were less definitive. More to the point, however, is that the ChiSq values for both the period search and pole search were significantly lower, almost half, for the shorter period. This gives further reason to believe that the shorter period of about 4 hours is the correct one. It’s very likely that additional dense data, especially at an apparition with the PAB longitude about 90° from the one in 2012, will refine both the period and the pole.

We *strongly* caution that this was a rare set of fortunate circumstances that allowed finding what appears to be a good spin axis solution based on dense data from only one apparition. In the *large* majority of cases, even with good sparse data, obtaining a solution of reasonable and sufficient confidence requires having a much larger set of good-quality sparse data and, more important, dense lightcurve data sets from at least three apparitions.

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ROTATION PERIOD DETERMINATIONS FOR 47 AGLAJA, 252 CLEMENTINA, 611 VALERIA, 627 CHARIS, AND 756 LILLIANA

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Synodic rotation periods and lightcurve amplitudes have been found for 47 Aglaja: 13.175 ± 0.002 h, 0.09 ± 0.01 mag; 252 Clementina: 10.864 ± 0.001 h, 0.37 ± 0.02 mag; 611 Valeria: 6.977 ± 0.001 h, 0.08 ± 0.01 mag; 627 Charis: 27.888 ± 0.002 h, 0.35 ± 0.02 mag; and 756 Lilliana: 7.834 ± 0.001 h, 0.17 ± 0.01 mag.

All observations reported here were made at the Organ Mesa Observatory using a Meade 35-cm LX-200 GPS Schmidt-Cassegrain (SCT), SBIG STL-1001E CCD, and clear filter. Exposures were unguided. Analysis used differential photometry only. Image measurement and lightcurve analysis were done by *MPO Canopus*. Because of the large number of data points, the data for the lightcurves presented here have been binned in sets of three points with a maximum time interval between points no greater than 5 minutes. In all cases, full or at least nearly-full phase coverage was obtained for the double period. When phased to the double period the two halves of the lightcurve looked the same within variations to be expected from observational error or changing phase angle. The probability of the double period being the correct one is extremely small and I reject all double-period solutions.

47 Aglaja. Several independent investigations listed in the Asteroid Lightcurve Data Base (Warner et al., 2012) are all consistent in showing a period near 13.178 hours. New observations were obtained on 6 nights from 2012 Apr 2 - May 7 to contribute to a

lightcurve inversion model. From these observations analysis found a period 13.175 ± 0.002 h, amplitude 0.09 ± 0.01 magnitudes, in complete agreement with previous studies.

252 Clementina. Previous period determinations for this asteroid are by Warner (2008, 10.862 h), Behrend (2012, 10.862 h), and Saylor and Leake (2012, 10.9 h). From new observations on 5 nights from 2012 Mar 23 - Apr 13, a period of 10.864 ± 0.001 h and amplitude 0.37 ± 0.02 mag were determined. This result is consistent with earlier studies.

611 Valeria. Previous period determinations for 611 Valeria are by Koff (2001, 10.80 h) and Behrend (2012, 6.98 h). Analysis of data obtained on 5 nights from 2012 Apr 15 - May 12 found a period of 6.977 ± 0.001 h, amplitude 0.08 ± 0.01 mag. This result is consistent with the period reported by Behrend (2012) and rules out the 10.8 hour period reported by Koff (2001).

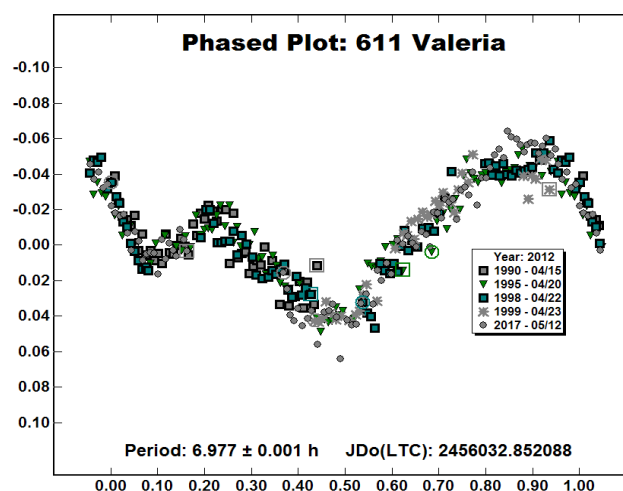
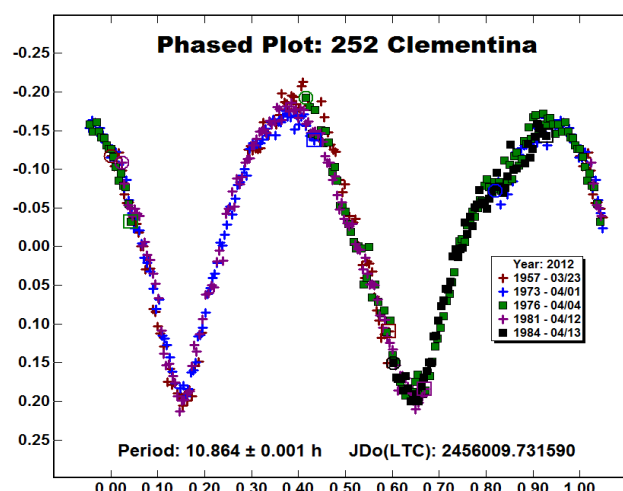
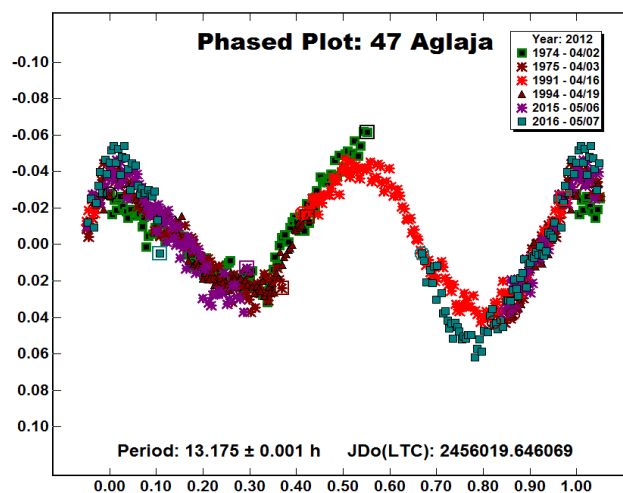
627 Charis. The only previous published attempt to find a period is by Behrend (2012), who states a provisional period of 48 h. The period given in the LCDB (Warner *et al.*, 2012) based on the Behrend lightcurve, is >24 h, meaning that the period was longer than this but no reasonable period could be assigned. Analysis of the data obtained on 14 nights from 2012 Apr 25 - June 21 finds a period of 27.888 ± 0.002 h, amplitude 0.35 ± 0.02 mag.

756 Lilliana. Previous period determinations for Lilliana are by Székely *et al.* (2005, 9.361 h), Warner (2008, 9.262 h), Warner (2010, 9.37 h), and Behrend (2012, 6.15 h). Amplitudes reported ranged from 0.07 to 0.99 magnitudes, but should be viewed with caution since they are inferred from discordant periods. New observations were obtained on 10 nights from 2012 Apr 5 - June 11. Analysis of the data found a period of 7.834 ± 0.001 h, amplitude 0.17 ± 0.02 magnitudes. The period spectrum of the new data is presented to show that these are inconsistent with any of the previously published periods. Brian Warner (personal communication) reports that a 7.834 hour period is a plausible solution within both the year 2007 measurements reported in Warner (2008) and the year 2001 measurements reported in Warner (2010). The large range of amplitudes at different orientations in the sky appears to be qualitatively real, but will require re-analysis of the respective data sets using the correct period to make quantitative assessments of amplitude at different aspects. 756 Lilliana could be a very interesting object for spin/shape modeling.

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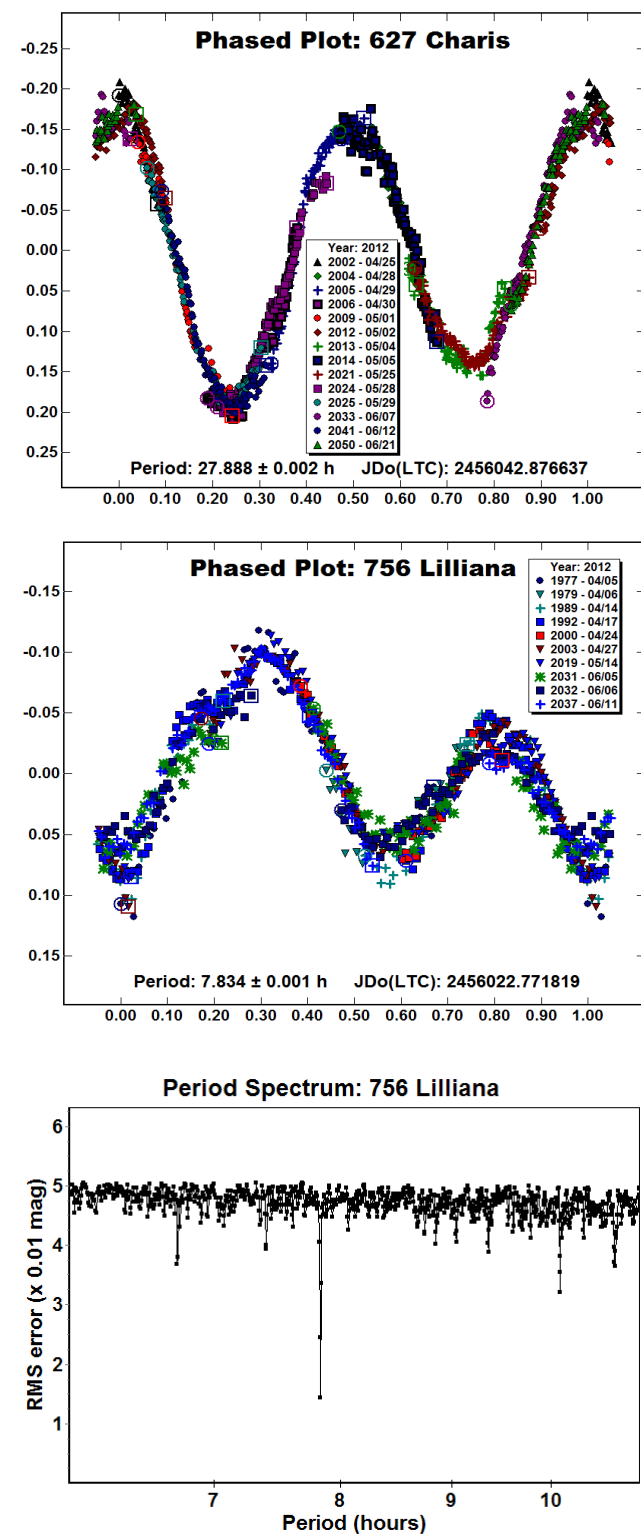
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ROTATION PERIOD DETERMINATION FOR 801 HELWERTHIA

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A consortium of observers from Australia, Europe, and North America have obtained lightcurves of the previously unobserved asteroid 801 Helwerthia. The period spectrum between 10 and 50 hours is presented, all minima on which have been carefully investigated. We strongly prefer a rotation period 23.93 ± 0.01 hours, amplitude 0.15 ± 0.03 magnitudes, with almost complete phase coverage, and consider all other alias periods to be highly unlikely.

First author Pilcher chose to observe 801 Helwerthia because the Asteroid Lightcurve Data Base (Warner et al. 2012) showed no previous observations. Observations on the first four nights 2012 March 24 - 31 suggested a period very close to that of the Earth. Full phase coverage would require observations from longitudes widely distributed around the Earth. Andrea Ferrero; the team of Luca Pietro Strabla, Ulisse Quadri, and Roberto Girelli; both from Italy; the team of Rasuli Inasaridze, Yurij Krugly, and Igor Molotov, observing from Kharkiv, Ukraine, and from Abastumani, Georgia Republic; and Julian Oey from Australia; all kindly contributed additional observations. We present the period spectrum between 10 and 50 hours, and explain our observational basis for considering 23.93 ± 0.01 hours, hereafter called the preferred period, to be much more likely than the other alias periods. By examining the period spectrum we immediately rule out all periods except $1/2P$ (half period), P , $3/2P$, $2P$ (double period), where P is considered 23.93 hours. We present lightcurves based on all observations 2012 Mar. 24 - Apr. 27